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RESEARCH

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WORD PROCESSING IN THE ELEMENTARY GRADES

In 1932, elementary school students in hundreds of United States classrooms were studied as they learned to write on portable manual typewriters. When compared with a control group of students who did their writing without typewriters, the students in the experimental classrooms wrote more and with more expression, showed gains in their reading scores, and became better spellers. Despite these strong positive results, the use of typewriters in elementary school classrooms never really caught on.

Today, many children are learning to write with microcomputers and word processing software. Microcomputers, however, provide them more revolutionary methods of producing written language than typewriters have ever permitted. A word processor provides the capability to create text and carry out various editing functions, including inserting, deleting, moving, and altering words, phrases, sentences, and paragraphs. Immediately after each revision, the new version of the text is available for display on the monitor or to be printed out on paper. Research on this phenomenon is still quite scarce, but the few studies that have been completed tend to have similar findings and, even more interestingly, echo the results of the 1932 study of typewriters.

Amount Written

The number of words in students' compositions has been determined in eight studies of the effects of word processing. The majority of the findings indicate that children write more with word processors than with traditional tools. The studies with the positive results ran for as short a time as ten weeks to as long as two years and among them involved children from grades one through eight. The following are results from three of these studies:

- A Toronto study of children in grades one, three, and six found that, over a period of six months, grades one and three children using microcomputers showed an average increase of 36 and 76 words respectively, while comparison children using traditional tools showed an average increase of 18 and 25 words respectively.

- In Montreal, a study was undertaken to assess the effects of a word processing program with 12 learning disabled elementary school children. (There was no control group.) After six months, the results indicated a highly significant increase. The average increase was 84 words per composition.

- In 1984-85, the American Yakima Indian Nation participated in a research project which aimed at improving English writing skills via word processing. For 47 students, the average increase was 73 words, a 51% increase. Again, there was no control group.

Quality

Of ten studies that have measured the effects of computer word processing on the quality of children's writing, eight report mostly positive findings. Some findings were based on "holistic" evaluation of children's compositions, some "analytic" evaluation, and some both. The following are results from four of these studies:

- Grade six children were randomly assigned to groups using traditional tools and word processors. Pre- and post-treatment writing samples were analytically evaluated. After ten weeks (30 minutes per day), the children using the microcomputers to write revealed significant gains in spelling, punctuation, and word usage.

- Forty K-3 children were randomly selected for a study of a software program that combined a word processor with a speech synthesizer. After eight weeks (60-90 minutes per week), the five and six-year-olds were significantly more able to invent spellings, express ideas, and write simple sentences. The seven and eight-year-olds significantly increased their ability to correctly spell words, use new vocabulary and punctuation, and extend their ideas. The investigator concluded that "the microcomputer can be an empowering learning tool for young children ...". There was no comparison group.

- The Toronto study (see above) evaluated writing samples both holistically and analytically. After six months, the holistic evaluations indicated that the grades one and three students who had worked with microcomputers had improved the quality of their writing significantly more than the comparison groups. Analytic evaluations revealed that grade one experimental students had improved significantly more than the comparison group in terms of spelling, punctuation/capitalization, syntax, organization, and ideas; grade three in terms of spelling, punctuation/capitalization, ideas and usage/word choice; and grade six in terms of spelling, syntax, and usage/word choice.

- In the Montreal study of learning disabled children (see above), quality of writing was assessed differently. For each writing session (twice a week for six months), the researcher kept logs on the number of edits that each subject performed. The increase in the number of edits was found to be highly significant. According to the researcher, "the students began to demonstrate the same type of writing behavior as successful writers."

Amount Written and Quality

The Toronto study collected over 3,000 pieces of writing done with traditional tools and computers. For all pieces, the number of words were correlated with the holistic evaluations of quality. While common sense tells us that more is not necessarily better, an average correlation of .65 suggests that children who write longer compositions frequently write better ones.

In another study, in a special needs school, where 90% of the students had English as a second language, the researcher observed grade two students over a period of three years. The researcher reported that with traditional tools, the average grade two story was four to six sentences long and that with computers, the average story was ten to fifteen lines or sentences. With computers, the stories were also better in terms of spelling, punctuation and syntax.

Transfer of Skills

If children are now learning to write with word processors, what will happen to their learning to write with traditional tools? This is an important and frequently asked question that has scarcely been addressed in the research. However, four of the studies reviewed (including the Toronto study) are of particular interest since they seem to suggest that a computer writing environment generalizes to the traditional paper and pencil environment. That is, students who practise their writing skills on a word processor may ultimately write longer and better compositions with traditional tools. These four studies involved students in grades one through six. More research is needed.

Adaptation and Age

The results of three studies suggest that primary age students may adapt to word processing more quickly than older elementary students. For example, the Toronto study found that the grades one and three children, when left to their own devices, were likely to compose directly on the computer whereas the grade six students frequently transcribed paper work to the computer. And, an American study of five eighth-graders concluded, after ten sessions, that the students composed on computer as they composed with paper and pencil and that they assimilated the new technology to their traditional models of composing. Other studies are needed.

Reading

Reading and writing skills are closely related. Two of the studies reviewed (including the Toronto study) found that, for primary age children, experience with writing on microcomputers was associated with improved reading skills. More research is needed.

References

These data and ideas are reported in 13 documents. A list is available on request. The report of the Toronto Board study published by the Ontario Ministry of Education in 1987 is entitled "Writing with Microcomputers in the Elementary Grades". Other research reports on writing-assistance tutorial software, text-editing programs, computer network writing, and computer- assisted instruction for the language arts exist but have not been included in this review.

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